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The Ohio Manufacturing Machinery and Equipment Investment Tax Credit: An Economic Impact Analysis

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THE OHIO MANUFACTURING MACHINERY AND EQUIPMENT INVESTMENT TAX CREDIT: AN ECONOMIC IMPACT ANALYSIS

Prepared for
The Ohio Economic Development Study Advisory Committee

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EXECUTIVE SUMMARY

This report is part of the Ohio Economic Development Study Project. It analyzes the Ohio Manufacturing Machinery and Equipment Investment Tax Credit and its impact on Ohio's economy. As a background, it also compares trends in Ohio's new capital expenditures against that of the United States, as a whole.

The Ohio Manufacturing Machinery and Equipment Investment Tax Credit (hereafter referred to as the Manufacturing Investment Program) offers a non-refundable corporate franchise or state income tax credit for Ohio manufacturers that purchase new machinery and equipment between July 1, 1995 and December 31, 2000. Eligible new investment must exceed the company's annual average investment in machinery and equipment in the same county for 1992-94. The tax credit is equal to 7.5 percent of the eligible investment or 13.5 percent if the eligible investment occurs in areas such as inner cities, distressed areas, labor surplus areas, and situational distressed areas.

MAJOR FINDINGS

Major findings are divided into three areas: manufacturing new capital expenditures in the U.S and Ohio, direct impact of the Manufacturing Investment Program, and total impact of the program.

Manufacturers' New Capital Expenditures in Ohio and the U.S.

- New capital expenditures by manufacturers in both Ohio and the U.S. grew by the largest percent between 1994 and 1995 comparing annual trends between 1992 and 1996. New capital expenditures grew by 13.9 percent in the U.S. and by 28.8 percent in Ohio. The Manufacturing Investment Program began in July of 1995.

- In contrast, Ohio manufacturers' new capital expenditures fell by 5.7 percent between 1995 and 1996, while that of the U.S. rose by 8.2 percent. This is counterintuitive to the expectations of increased capital expenditures due to the tax credit program. However, the 1996 decrease could have been due to over-expansion in 1995; the level of new expenditures in 1996 is still 21 percent over the 1994 level.

Direct Impact

- In the first two years of the program (mid 1995 to mid 1997), 1,758 notices of intent to claim the credit were filed. Participating firms spent $3.5 billion on new machinery and equipment, of which $2.4 billion was eligible for the tax credit.

- Ohio manufacturers that participated in the Manufacturing Investment Program received a total tax credit of $232 million over seven years, or $33 million annually.

- The regions with major urban areas have the most claims because they have the highest number of manufacturers. The regions that include Cleveland, Cincinnati, and Columbus account for 59 percent for all claims and 53 percent of new investments.

- Ohio's Northeast Region has the highest number of notices for tax credit, accounting for 39 percent. It also accounts for one-fourth of new investments. This may be due to the large size of the Northeast Region, whose share of Ohio's manufacturing establishments is 43 percent.

- The largest industry group to take advantage of the tax credit was fabricated metals, with 22 percent of notices, followed by non-electric machinery with 12 percent of notices. However, in terms of new investments, the fabricated metals industry, with $580 million, is closely followed by the primary metal industry with $560 million of new investments in machinery and equipment.

- The number of tax credit notices in distressed areas, as defined by the program guidelines, accounts for one-third of the notices and new investments, while accounting for one-half of the tax credits. This is a direct result of the higher tax credit rate of 13.5 percent in distressed areas compared with 7.5 percent in non-distressed areas.

Total Impact

- Methodology: the REMI model was used to measure the total economic impact (both benefits and costs) of the Manufacturing Investment Program on the Ohio economy. The REMI model was chosen because of its structure and reputation. Economic impact is estimated by comparing a baseline REMI forecast of the Ohio economy with an alternative forecast that takes into account the Manufacturing Investment Program. Two policy variables were changed to create the alternative forecast, reduction in capital costs and reduction in government spending.

- The REMI model estimates the impact of the Manufacturing Investment Program based on the assumption that the program exists for the time period July 1, 1995 through December 31, 2000.

- The REMI model predicts that total employment as a result of the tax credit will increase by over 1,000 employees in both 1996 and 1997. It then predicts smaller employment gains in 1998-2000, employment losses in 2001-2006 and small increases afterwards.

- Private non-farm employment that excludes farm and government employment is projected to increase in most years. Government employment is projected to decline in all years because of the change introduced into the REMI model of lower government spending.

- Manufacturing jobs are projected to increase until the year 2005, with a larger share of the jobs in durable manufacturing. The share of all projected additional employment that is accounted for by manufacturing jobs is larger than their share of total employment. This is a direct result of the stimulus of the Manufacturing Investment Program.

- Ohio's Gross State Product (GSP), measuring the value of all goods and services produced in Ohio in 1992 dollars, is projected to increase between $65 million and $91 million each year during 1996-2000. It is projected to increase only slightly during the following five years, and then shows a very moderate rise. GSP is projected to increase in all years, except at different levels in each.

- Personal income and disposable income also show small positive effects in the first six years and then show a small negative impact after the year 2001. These effects are due to changes in employment.

- Due to the structure of REMI outputs, tax impacts of the program could not be analyzed. Because the REMI model does not currently disaggregate federal, state, and local tax impacts, state tax impacts could not be estimated.

CONCLUSIONS

- The Manufacturing Investment Program has a small positive impact on Ohio's economy as measured in terms of jobs, gross state product, and personal income. Because no specific return-on-investment expectations currently guide the program, it is not possible to determine whether this performance is to be considered positive or negative.

- Using employment gains of 1,067 in 1996 as projected by the REMI and the total annual average tax credits of $33 million, this suggests a state government cost per job of $31,000 for 1996.

RECOMMENDATIONS

- If the Manufacturing Investment Program continues in the future, we strongly recommend that the average investment for each company that determines its eligible investment for tax credit be made more current. At present, average investment is calculated based on expenditures on machinery and equipment in 1992-1994. This was a good decision when the program was initiated in 1995. Recently the program was extended from the end of 1998 to the end of the year 2000 without adjusting the years used to calculate average investment.

- Improve data collection procedures. We recognize that the data is self-reported by the companies that receive tax credits. However, better employment and financial investment data would be very beneficial for future evaluations.

INTRODUCTION AND PURPOSE

This report describes and evaluates one of Ohio's tax economic development incentive programs, the Ohio Manufacturing Machinery and Equipment Investment Tax Credit (hereafter referred to as the Manufacturing Investment Program). The program's objective is to stimulate and encourage manufacturers to continue to invest in new machinery and equipment.

The report presents information on trends in new capital expenditures by manufacturers in Ohio and the U.S. The growth in Ohio's new capital expenditures is compared to the growth in the U.S. during the years that Ohio's new tax credit was initiated. The report then describes the Manufacturing Investment Program and the tax credits that Ohio manufacturers receive due to their purchases of new machinery and equipment. Lastly, it explains the methodology used to estimate total impact and describes the total impact of this tax credit program on Ohio's economy.

MANUFACTURERS' NEW CAPITAL EXPENDITURES: TRENDS IN OHIO AND THE U.S.

The following tables examine trends in new capital expenditures for both Ohio and the U.S. Data on new capital expenditures is collected annually by the U.S. Census in its Survey of Manufacturers. Table 1 shows new capital expenditures for the years 1992 through 1996. In the U.S., there was a small decrease in spending between 1992 and 1993, followed by a 9.4 percent increase between 1993 and 1994. Between 1994 and 1995, a significant increase of 13.9% occurred. This increase in spending could be due to the end of the recession of the early 1990's. The level of spending increased at a smaller rate from 1995 to 1996, with an 8.2 percent increase.

Table 1: New Capital Expenditures by Manufacturers

	U.S.		Ohio		
	Millions ($)	% Change	Millions ($)	% Change	% of U.S.
1992	103,188		6,264.7		6.1%
1993	103,133	-0.1%	6,354.6	1.4%	6.2%
1994	112,784	9.4%	6,172.5	-2.9%	5.5%
1995	128,478	13.9%	7,951.5	28.8%	6.2%
1996	139,058	8.2%	7,496.0	-5.7%	5.4%

Source: Annual Survey of Manufactures 1993, 1994, 1995, 1996

Ohio, in comparison, had a slight increase between 1992 and 1993, followed by a decline in spending from 1993 to 1994. Like the U.S., Ohio also had a large increase from 1994 to 1995 of 28.8 percent. This percentage was a considerably higher proportion than the U.S. as a whole, at 13.9 percent. The tax credit program was initiated in July of 1995, which could provide a partial explanation for this increase. From 1995 to 1996, however, Ohio experienced a decrease in new capital expenditures of 5.7% while the U.S. increased spending by 5.3%. The Ohio decline could be a reaction to the high level of spending in the previous year. The initial expectation of the tax credit program, however, would have been an increase in spending for 1996, the first full year of the program.

Table 1 also presents Ohio's percentage of total U.S. spending for each of the years. Ohio's share varies between five and six percent, rising between 1994 and 1995 and then declining between 1995 and 1996. Once again, this decline is counterintuitive to the expectations of the program. It should also be noted that, in 1996, Ohio accounted for the lowest ratio of expenditures (5.4%) in the U.S. for the time period 1992 to 1996.

Changes in new manufacturing capital expenditures can also be examined within specific industries. Table 2 shows changes in spending for both Ohio and the U.S for the six largest industries, in terms of new capital expenditures.

Table 2: Ohio Manufacturing New Capital Expenditures (millions of dollars)

SIC	Industry	Ohio 93	Ohio 94	Ohio 95	Ohio 96	U.S. 93	U.S. 94	U.S. 95	U.S. 96
28	Chemicals & Allied Products	475	529	672	697	15,690	15,455	17,562	20,046
30	Rubber & Misc. Plastic Products	557	600	870	682	5,001	5,774	6,639	7,022
33	Primary Metal Industries	650	695	949	899	4,744	6,530	6,672	7,299
34	Fabricated Metal Products	624	618	881	769	5,774	5,792	7,090	6,874
35	Industrial Machinery & Equipment	443	616	744	761	7,909	9,209	9,971	11,448
37	Transportation Equipment	1,624	1,098	1,383	1,220	11,416	11,767	13,303	13,461

SIC	Industry	% Change Ohio 93-94	% Change Ohio 94-95	% Change Ohio 95-96	Ohio as a % of U.S. 93	Ohio as a % of U.S. 94	Ohio as a % of U.S. 95	Ohio as a % of U.S. 96
28	Chemicals & Allied Products	11.2%	27.1%	3.8%	3.0%	3.4%	3.8%	3.5%
30	Rubber & Misc. Plastic Products	7.6%	45.0%	-21.7%	11.1%	10.4%	13.1%	9.7%
33	Primary Metal Industries	7.0%	36.6%	-5.3%	13.7%	10.6%	14.2%	12.3%
34	Fabricated Metal Products	-0.9%	42.6%	-12.8%	10.8%	10.7%	12.4%	11.2%
35	Industrial Machinery & Equipment	39.0%	20.7%	2.3%	5.6%	6.7%	7.5%	6.6%
37	Transportation Equipment	-32.4%	26.0%	-11.8%	14.2%	9.3%	10.4%	9.1%

Source: Annual Survey of Manufactures 1993,1994,1995, 1996

During the period the program was in effect, 1995 to 1996, Ohio capital expenditures experienced declines in rubber and miscellaneous plastic products, primary metal industries, fabricated metal products, and transportation equipment. Small increases in spending occurred in chemicals and allied products and industrial machinery and equipment. In addition, the share of U.S. new capital expenditures declined for all six industries. As mentioned previously, this decline may be contrary to what could be expected from a tax incentive program; however, the analysis could only look at a very limited time period at this point. The impact may be larger over a longer period of time. Unless all other states initiated similar programs, Ohio's share relative to the rest of the U.S. would have been expected to increase.

THE MANUFACTURING INVESTMENT PROGRAM

PROGRAM DESCRIPTION

The program offers a non-refundable corporate franchise or state income tax credit for Ohio manufacturers that purchase new machinery and equipment between July 1, 1995 and December 31, 2000.[1] Eligible new investment must exceed the company's annual average investment in machinery and equipment in the same county, where the average is calculated based on such investments between 1992 and 1994. The tax credit is equal to 7.5 percent of the eligible investment or 13.5 percent if the eligible investment occurs in areas such as inner cities, distressed areas, labor surplus areas, and situational distressed areas. The full tax credit is given over a seven-year period, so one-seventh of the full tax credit may be taken in seven successive tax years. Also, any unused credit may be carried forward for up to three tax years.

DIRECT PROGRAM IMPACTS

The following section discusses the direct impacts of the Manufacturing Investment Program. First, the direct program impacts for the State of Ohio are examined. Results are then presented by region and county and then by major industry. Finally, the impacts in distressed and non-distressed areas are compared.

DIRECT STATE IMPACT

Table 3 summarizes the Manufacturing Investment Program's direct results. In the first two years of the program (mid year 1995 to mid year 1997)[2], 1,758 notices of intent to claim the credit were filed. New purchases of 3.5 billion dollars were made by participating firms, which resulted in a total tax credit of $232 million, or $33 million annually (over seven years).

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[1] The Ohio legislature has extended the Manufacturing Investment Tax Credit Program until December 31, 2000. The Program's previous termination date was December 31, 1998.

[2] Tax credit data are available from July 1, 1995 through the early parts of 1997. The program started in July 1995 and data collection is not complete because it depends on tax forms submitted by firms applying for the credit.

Table 3: Machinery and Equipment Investment Tax Credit 1995-1997*

# of Notices of Intent Filed	1758
Proposed New Purchases	$3,586,939,115
Average Investment 1992-1994	$1,181,049,886
Net Eligible for Tax Credit	$2,405,889,229
Total Tax Credits	$231,949,676
Annual Tax Credits (Over 7 Years)	$33,135,668

* Data begin July 1995 and data for 1997 is partial

Source: The Urban Center at Cleveland State University and the Ohio Department of Development

The tax credit is determined based on the difference between the average of a firm's investment in new machinery and equipment for the years 1992-1994 and new purchases made during the program's eligible time period. It is calculated by subtracting the average investment from the new investment. The resulting amount equals the eligible amount for the credit. A credit of 7.5 percent, or 13.5 percent for distressed areas, is then applied and split over seven years. Thus, new purchases of $3.6 billion and average investments of $1.2 billion resulted in $2.4 billion eligible for the credit.

IMPACT BY REGION

Table 4 and Appendix A present the program's direct impacts by sub-state economic region and by county. Table 4 shows that Ohio's North East region has the highest number of notices, accounting for 39 percent. As would be expected, the regions with major urban areas have the highest number of claims, as they have the highest number of total manufacturers. The regions that include Cleveland, Cincinnati, and Columbus account for 59 percent of all claims and 53 percent of new investments. Analyzing tax credits by county (Appendix A) reveals that Cuyahoga had one-tenth of all claims and Hamilton and Montgomery counties each had about five percent of claims.

Table 4: Manufacturing and Equipment Tax Credit by Ohio's Economic Regions (millions)

Economic Region	# of Notices	% of Notices	Average Investment ($)	New Investment ($)	Tax Credit ($)	Annual Credit ($)
Norht East	682	38.8%	337.7	907.3	51.4	7.3
South West Cincinnati	180	10.2%	123.0	337.3	19.3	2.8
North Central	168	9.6%	83.0	346.0	28.9	4.1
North West	152	8.7%	146.4	736.7	61.5	8.8
South West Dayton	149	8.5%	142.4	234.7	7.9	1.1
Mid Central	138	7.9%	151.6	331.3	14.7	2.1
West Centrak	131	7.5%	103.3	356.1	20.1	2.9
South East	105	6.0%	77.7	260.2	21.4	3.1
South Central	52	3.0%	14.7	75.9	6.7	1.0
Total	1,757.0	100%	1,179.7	3,585.5	231.9	33.1

Source: The Urban Center at Cleveland State University and the Ohio Department of Development

IMPACT BY INDUSTRIES

Table 5 reviews direct program impacts for major industry groups with more than twenty-five notices filed. These industries account for 93 percent of all notices. The largest industry group to take advantage of the tax credit was fabricated metals, with almost one-fourth of notices, followed by the non-electric machinery with 12 percent. It should be noted that fabricated metals is the second largest industry group in Ohio, based on employment. Fabricated metals also had the highest level of new investment, followed by primary metals, which ranked sixth in terms of notices filed.

Table 5: Largest Industry Groups by # of Notices Filed*
(millions)

SIC	Industry Group	# Notices	Average Investment ($)	New Investment ($)	Tax Credit ($)	Annual Credit ($)
34	Fabricated Metals	388	142.6	580.3	44.4	6.3
35	Non-Electric Machinery	200	86.0	211.8	11.2	1.6
30	Rubber & Plastics	172	63.5	180.4	12.3	1.8
28	Chemicals	120	67.5	254.4	16.8	2.4
33	Primary Metals	102	174.0	560.8	41.0	5.9
36	Electrical Equipment	96	117.8	309.1	14.6	2.1
39	Misc Manufacturing	82	25.6	69.3	4.1	0.6
20	Food	71	74.1	182.5	10.3	1.5
32	Stone, Clay, Glass	71	0.0	255.2	255.2	255.2
26	Paper	70	36.0	108.1	5.8	0.8
37	Transport Equipment	62	216.4	358.5	46.3	4.3
27	Printing & Publishing	56	20.6	206.7	21.8	3.1
24	Lumber and Wood Products	32	10.0	22.9	1.6	0.2
29	Petroleum and Coal Products	26	3.4	7.8	0.5	0.1

*SIC data is incomplete for 95 firms claiming the credit. Table 5 includes data from the remaining 1663 firms.
Source: The Urban Center at Cleveland State University and the Ohio Department of Development

DISTRESSED AREAS VERSUS NON-DISTRESSED AREAS

A higher tax credit, 13.5 percent, is available to manufacturers making machinery and equipment investments in eligible areas. These areas are defined annually by the Ohio Department of Development. Eligible areas must be classified as distressed areas, labor surplus areas, inner city areas, or situational distress areas. For 1996, 27 counties and 22 communities were eligible for the 13.5 tax credit. Distressed areas are municipal corporations or counties that meet requirements based upon average rates of unemployment, per capita income, percent of residents below the official poverty line, or the ratio of transfer payment income. Inner city designation is based on poverty level, and situational distress areas have experienced a closing or downsizing of a major employer that adversely affects the economy. Situational distress is a temporary designation that is not to exceed thirty-six months.

Table 6 summarizes the investments and credits for distressed and non distressed areas. In non-distressed areas, there were 1,183 tax credit notices filed, accounting for two thirds of the notices. Tax credit notices in distressed areas accounted for the remaining third, with 575 notices. In addition, tax credits in distressed areas accounted for almost one half of the tax credits although distressed areas only accounted for one third of average and new investments. This larger share of tax credits was due to the higher rate of 13.5 percent applied to investments in distressed areas. The North East region had the highest amount of distressed claims and investment with 39 percent of claims.

Table 6: Distressed versus Non-distressed Areas

Non-Distressed (7.5%)	# Notices	Average Investment ($)	New Investment ($)	Tax Credit ($)	Annual Credit ($)
North East	459	191.1	616.9	31.9	4.6
South West Cincinnati	134	63.1	223.3	12.0	1.7
Mid Central	112	126.5	285.5	11.9	1.7
West Central	109	96.6	329.9	17.5	2.5
South West Dayton	108	132.2	207.7	5.7	0.8
North West	106	118.8	422.6	22.8	3.3
North Central	97	52.0	163.4	8.4	1.2
South East	46	17.8	71.9	4.1	0.6
South Central	12	2.8	29.1	2.0	0.3
Total	1183	800.9	2,350.2	116.2	16.6
		0.0	0.0	0.0	0.0
Distressed (13.5%)		0.0	0.0	0.0	0.0
North East	224	146.6	290.4	19.4	2.8
North Central	71	31.0	182.6	20.5	2.9
South East	59	59.9	188.3	17.3	2.5
North West	46	27.6	314.2	38.7	5.5
South West Cincinnati	45	59.9	114.0	7.3	1.0
South West Dayton	41	10.2	27.0	2.3	0.3
South Central	40	11.9	46.8	4.7	0.7
Mid Central	26	25.0	45.8	2.8	0.4
West Central	23	6.7	26.3	2.6	0.4
Total	575	378.8	1,235.3	115.6	16.5

Source: The Urban Center at Cleveland State University and the Ohio Department of Development

METHODOLOGY USED TO MEASURE TOTAL ECONOMIC IMPACT

To estimate the economic impact on a regional economy caused by a change in public policy, several models can be utilized, all based on an input-output model of the regional economy. This section describes what an input-output model is and explains the model that was utilized for this study.

INPUT-OUTPUT MODEL

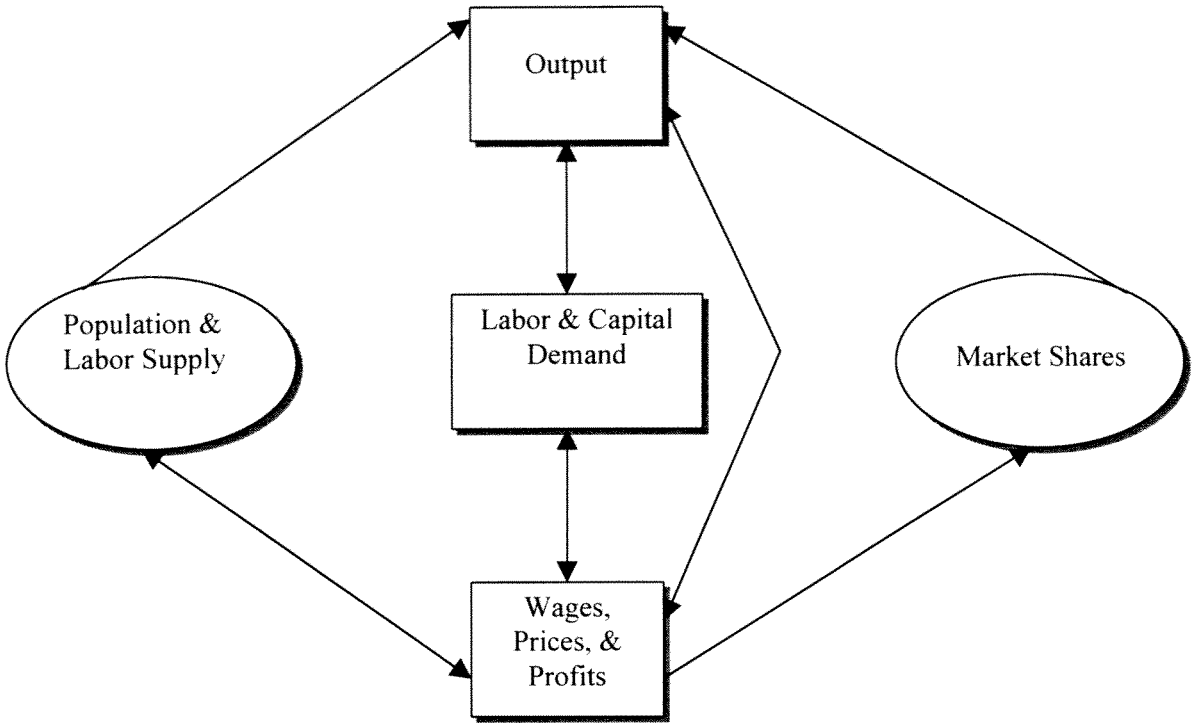
An input-output model describes the relationships that exist among all industrial sectors of the economy, including the household sector and a foreign sector. It estimates the inputs and products that each industry *purchases* from the region's other industries as well as products and services it *sells* to other industries and sectors. An input-output model is used to measure the repercussions that changes in final uses have on the region's industries. This means that increased demand for one industry's products impacts other industries that have buy/sell relationships with it. The resulting changes on these industries will then affect other industries and sectors, and so on, until an initial change in one industry ripples throughout the economy.

THE REMI MODEL

For this study, the REMI model was used to measure the economic impact of the investment tax credit on the Ohio economy.[3] More specifically, REMI Policy Insight, the newest version of REMI's software, was utilized for this study. The REMI model was chosen because of its structure and reputation. The REMI model shares two underlying assumptions with mainstream economic theory: households maximize their utility and producers maximize profits. The REMI model includes hundreds of equations that describe cause-and-effects relationships in the economy, going beyond an input-output model. Figure 1 provides a simplistic presentation of the REMI model.

[3] REMI stands for Regional Economics Models, Inc. located in Amherst, Massachusetts.

Figure 1: Overview of the REMI model



Source: REMI Policy Insight, User Guide.

The Output block in Figure 1 includes all the inter-industry relationships that are in an input-output model.[4] The Labor and Capital Demand block indicates how labor and capital requirements depend on their relative prices as well as on output.[5] Population and Labor Supply create demand for products from the Output block and also determine wages in the labor market.[6] The feedback (double arrow between the Population and Labor Supply block and the Wages, Prices, and Profits block) suggests that economic migrants respond to labor market conditions. Demand and supply interact in the Wage,

[4] State and local government spending, investment, exports, consumption, and real disposable income influence the Output block.

[5] The Labor and Capital Demand block depends on employment, labor/output ratio, and optimal capital stock.

[6] The Population and Labor Supply block depends on population and migration.

Price, and Profit block, which influences the Market Shares block that along with components of demand, determine Output.[7,8]

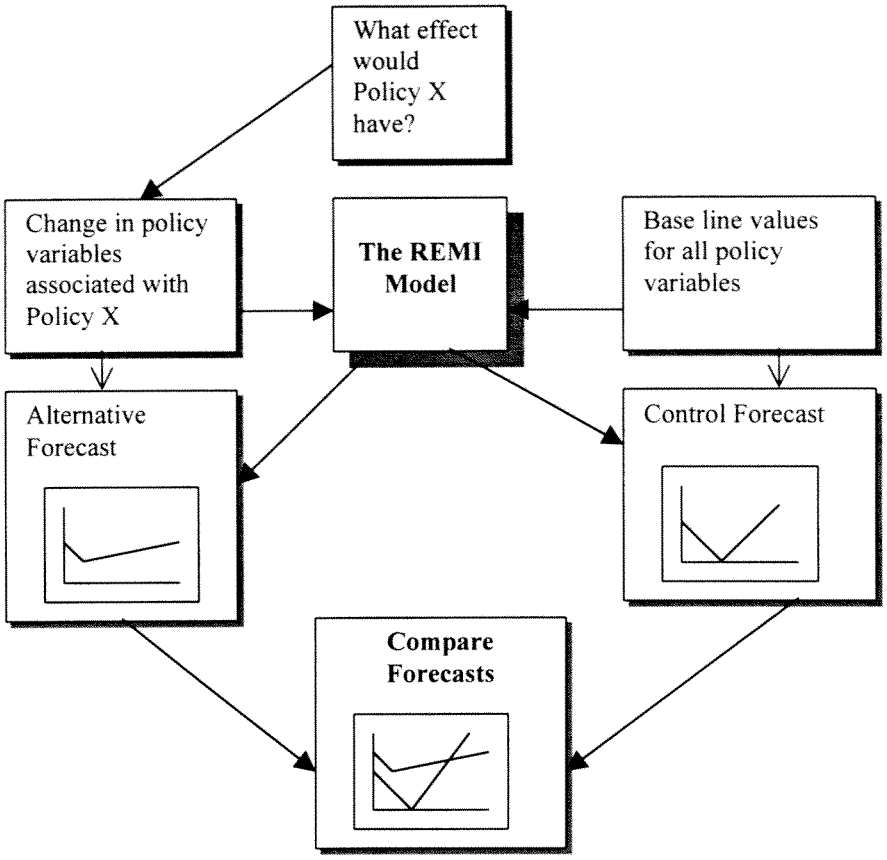
The REMI model uses extensive data sets to estimate key inter-relationships of the economy. REMI builds customized regional models using data from the Census Bureau, Bureau of Labor Statistics, Bureau of Economic Analysis, Department of Energy, and other public sources. The model provides long-term projections, with general equilibrium properties, that are called control forecasts.

When a REMI model is used to estimate an economic impact, one needs to understand how the model works and how the model variables interact with each other. Figure 2 shows how the impact is measured for a policy change called "Policy X". The figure illustrates that the baseline forecast (or control forecast) is compared to an alternative forecast that is based on the changed policy. The difference between the two forecasts provides an estimate of the total economic impact.

[7] Many factors enter the Wage, Price, and Profit block. These include employment opportunity, wage rate, consumer price deflator, real wage rate, production costs, profitability, industry sales price, and housing price.

[8] The Market Shares block refers to the shares of both local and external markets.

Figure 2: Measuring Economic Impact in REMI



Source: REMI Policy Insight, User Guide.

How was the REMI Model Used to Estimate Total Impact from the Manufacturing Investment Program?

The analysis conducted for this study used the tax credit information described in the previous section. Two of REMI's policy variables were changed to create the alternative forecast. The first policy change was reducing the cost of capital by the tax credits given to manufacturers because the tax credits reduce the cost of acquiring new machinery and equipment. It is also assumed that the improvement to productivity and substitution of capital for labor occur during the first year of the new investment.

The second changed policy variable was a reduction in government spending due to foregone taxes. With its control forecast, the REMI model assumes a balanced budget. Thus, when taxes are reduced, government spending has to be decreased as well, because the model does not adjust for it automatically.

This study estimates the economic impact of machinery and equipment tax credits given in 1996 through 2000. However, only 1996 data were used because it is the only complete year with available data.[9] The 1996 total tax credits were distributed across the industrial sectors that received them, as described in Table 5 which shows the program's direct effects (for complete details see Appendix B).[10] The manufacturing investment program is in effect until the end of the year 2000, so the tax credits for 1997 through 2000 were assumed to be the same as in 1996.[11] As a result, REMI's capital costs were reduced by the 1996 investment tax credits in each of the years between 1996 and 2000.

The government spending reductions, however, were staggered over a seven-year period, because manufacturers get the tax credit over a seven-year period. For example, the amounts of tax credits awarded in 1996 were divided by seven, and each one-seventh was used to reduce government expenditures during 1996-2002. As a result, the following policy changes were made in the REMI model. In 1996, capital costs were fully reduced by industrial sectors using the 1996 data and government spending was reduced by one-seventh. In 1997, capital costs were again fully reduced by industrial sectors using the 1996 data and government spending was reduced by two-sevenths (one-seventh from the 1996 tax credits and one-seventh from the 1997 tax credits). The last year that capital costs are reduced at the full 1996 level is 2000, while government spending was reduced by five-sevenths in that year. For the following six years (2001-2006) no capital cost reductions are introduced into the REMI model, but portions of the tax credits continue to be deducted from government spending until the year 2006, where only one-seventh is deducted.

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[9] Tax credit data are available from July 1, 1995 through the early parts of 1997. The program started in July 1995 and data collection for 1997 is not complete because it depends on tax forms submitted by companies applying for the credit.

[10] The SIC was not available for 58 firms. These firms were excluded from the analysis and accounted for 2.8 percent of new investments and 1.7 percent of tax credits in 1996.

[11] New capital expenditures between 1992 and 1996 were analyzed to project a trend for 1997-2000. The analysis, as presented in Table 7, showed fluctuations from one year to another and did not suggest upward or downward trends. As a result, 1996 data were used to describe investments in all subsequent years.

TOTAL ECONOMIC IMPACT

This section describes the total economic impact on Ohio's economy that results from the manufacturing investment program. The impact is calculated as the difference between the control forecast and the alternative forecast as illustrated in Figure 2, where the alternative forecast is based on changes in the two policy variables described above. The impact is measured in terms of number of jobs, output, and personal income. Table 7 presents these results, showing the impact on the Ohio economy as a whole. Number of jobs is shown as total employment and private non-farm employment that excludes farm and government jobs.

Table 7: Total Economic Impact

	1996	1997	1998	1999	2000
Total Employment	1,067	1,034	858	577	249
Private non-farm employment	1,381	1,639	1,741	1,724	1,647
Gross State Product (mill of $92)	$65.6	$81.9	$89.4	$90.8	$88.3
Personal income (mill of nominal $)	$35.4	$39.9	$38.7	$31.7	$20.9
Disposable personal income (mill of nominal $)	$29.2	$33.1	$32.5	$26.8	$17.9

	2001	2002	2003	2004	2005
Total Employment	-1041	-1365	-1082	-765	-440
Private non-farm employment	333	-8	-12	27	84
Gross State Product (mill of $92)	$21.7	$0.2	$2.3	$7.6	$4.3
Personal income (mill of nominal $)	$28.6	-$48.5	-$46.1	-$38.8	-$28.1
Disposable personal income (mill of nominal $)	$22.9	$39.5	$37.9	$32.2	-$23.5

	2006	2007	2008	2009	2010
Total Employment	-116	188	864	49	-55
Private non-farm employment	152	212	106	23	-38
Gross State Product (mill of $92)	$22.5	$30.6	$23.6	$17.8	$13.1
Personal income (mill of nominal $)	-$14.7	-$0.2	-$2.1	-$4.7	-$7.1
Disposable personal income (mill of nominal $)	-$12.5	-$0.5	-$2.1	-$4.2	-$6.1

Source: The Urban Center at Cleveland State University and JEK Analytics

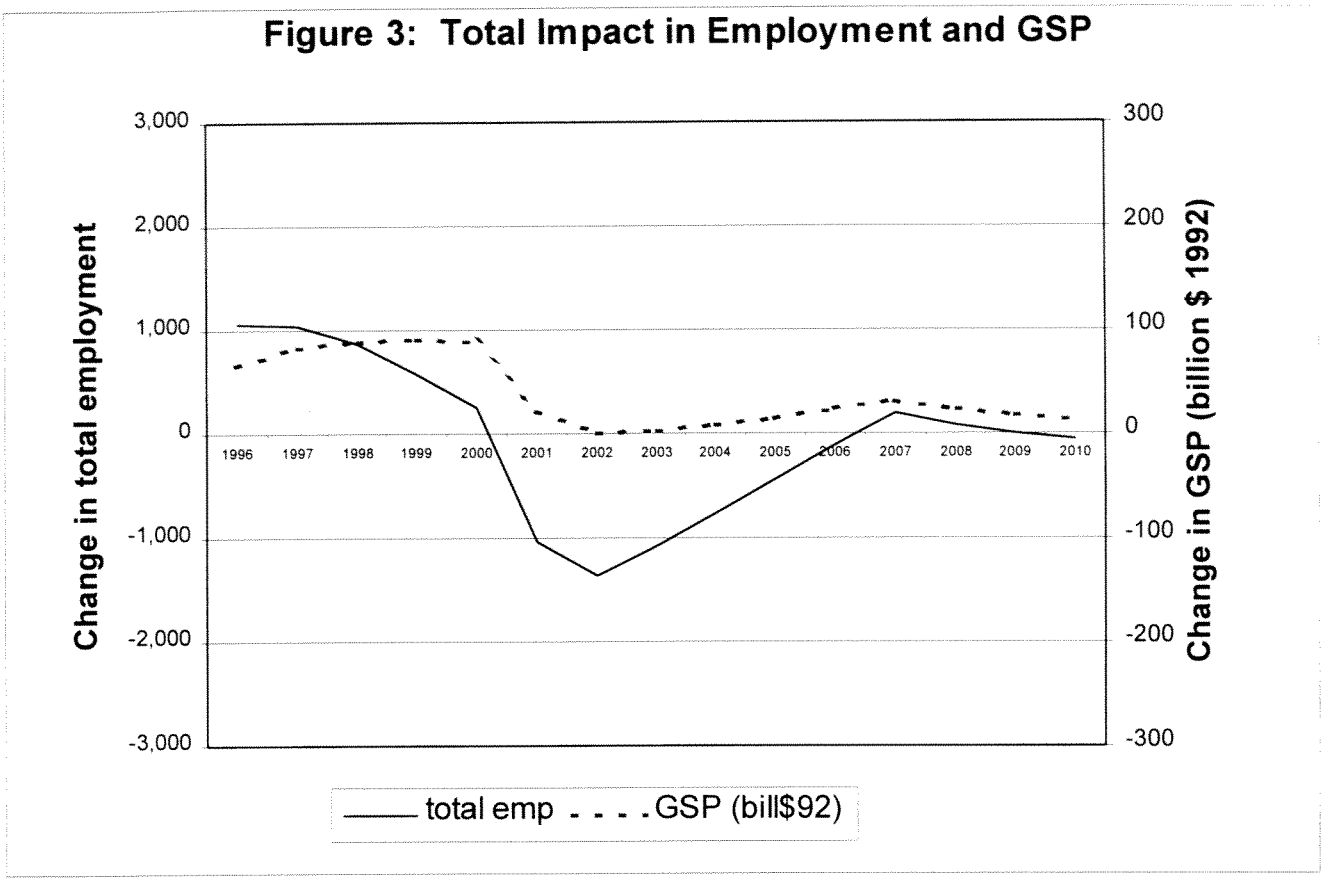
Table 7 indicates that the manufacturing investment program has a moderately positive impact through the year 2000, the years the program is in effect. As explained earlier,

this REMI simulation assumes that the program will end by December 31, 2000, which is the date the program is scheduled to be terminated according to current legislation.

The REMI model predicts that the tax credits would result in increased total employment of over 1,000 employees in both 1996 and 1997. It then predicts smaller gains in the next three years and employment declines between the years 2001 and 2006. Small employment increases are forecast to result from the investment tax credit program in the years 2007 through 2010. However, private non-farm employment is showing a more positive impact because it excludes government employment, which is projected to decline as a result of the reductions in government spending introduced in this simulation. Thus, private non-farm employment that excludes both farm and government jobs, increases between 1,380 and 1,750 in each of the first five years of the impact, 1996-2000. It increases by much less in the following years.

Measured in 1992 dollars, Ohio's Gross State Product (GSP), which measures the value of all goods and services produced in Ohio, is projected to increase by $65 million to $91 million in each of the years between 1996 and 2000 because of the program. GSP is projected to increase only slightly in the following five years (due to the foregone taxes) and then shows a very moderate rise in the last five years of the simulation. Personal income and disposable personal income show similar effects as employment. There is a small positive effect in the first six years and then it becomes a small negative impact after the year 2001.

Figure 3 illustrates the total impact in terms of employment and GSP from 1996 to 2010, as described in Table 7. As previously stated, these numbers represent the difference between the REMI control forecast and the policy simulation for the manufacturing investment program. The declining employment line between 1996 and 2000 describes a positive change in employment due to the program, which is occurring each year at a declining level. For example, employment increased by 1,000 in 1996 and increased by about 500 in 1999.



Source: The Urban Center at Cleveland State University and JEK Analytics

To summarize, the economic impact of Ohio's manufacturing investment tax credit, in effect between 1996 and 2000, is very modest. The economic impact is moderately positive in the period that the program is in effect and the impact then becomes negative (although small) because of the lingering effects of the tax credits that is given for seven years following the purchase of the machinery and equipment. This is true in all five measures presented in Table 7.

Economic Impact by Industry

This section details the employment impacts in Ohio's major industrial sectors, as shown in Table 8. In the first five years, employment gains in non-manufacturing industries were larger that those in manufacturing. This gain, or large portions of this gain, may be due to a multiplier effect. However, the Manufacturing Investment Program added more manufacturing jobs than their share of the economy would suggest. Manufacturing jobs

account for close to one-quarter of all jobs in Ohio, while their shares of the additional private non-farm jobs created as a result of the tax credits range from 32 percent to 39 percent. Moreover, the manufacturing investment program increased total employment for only the first five years, while manufacturing jobs increased through the year 2005. It is also interesting to note that, among manufacturers, more jobs were added in durable goods manufacturing then in non-durable goods manufacturing.

Table 8: Economic Impact by Industry

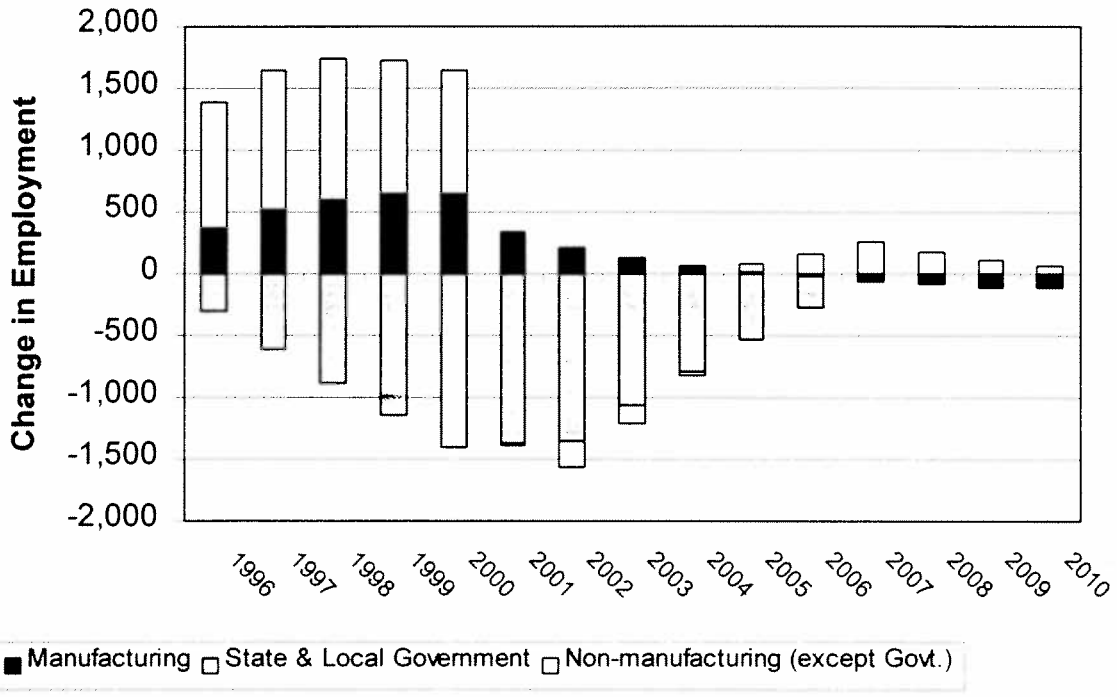
	1996	1997	1998	1999	2000	2001	2002	2003
Total Employment	1,067	1,034	858	577	249	-1,041	-1,365	-1,082
Private Non-farm	1,381	1,639	1,741	1,724	1,647	333	-8	-12
Manufacturing	372	521	602	637	643	344	205	123
Durables	280	383	436	456	456	230	134	75
Non-durables	92	139	166	181	187	114	72	47
Non-manufacturing	1,010	1,118	1,138	1,087	1,004	-11	-213	-134
Mining	13	18	20	22	22	12	8	6
Construction	172	146	108	63	17	-193	-213	-171
TCPU	52	63	68	69	67	20	5	7
FIRE	56	59	55	48	39	-18	-31	-22
Retail	268	279	268	234	191	-84	-137	-106
Wholesale	78	98	110	115	116	39	19	17
Service	362	448	502	532	550	221	146	141
Agri-Forest-Fish	9	8	7	5	3	-8	-10	-8
Total Government	-314	-605	-883	-1,147	-1,399	-1,374	-1,358	-1,070

	2004	2005	2006	2007	2008	2009	2010
Total Employment	-765	-440	-116	188	86	5	-55
Private Non-farm	27	84	152	212	106	23	-38
Manufacturing	64	20	-13	-38	-68	-89	-102
Durables	34	3	-20	-38	-57	-70	-78
Non-durables	30	17	7	0	-11	-19	-24
Non-manufacturing	-37	64	166	251	174	112	63
Mining	5	4	4	4	3	2	1
Construction	-126	-82	-39	2	-3	-7	-10
TCPU	11	14	18	22	16	12	8
FIRE	-12	-2	8	16	11	7	4
Retail	-68	-30	7	39	23	9	-1
Wholesale	17	18	21	23	17	12	8
Service	142	144	147	144	107	77	54
Agri-Forest-Fish	-5	-3	0	2	1	1	0
Total Government	-792	-525	-268	-25	-20	-18	-17

Source: The Urban Center at Cleveland State University and JEK Analytics

Among non-manufacturing jobs, employment increased in each of the major sectors except for government during the first five years (Figure 4). Retail and service jobs show the most growth among the non-manufacturing industries. All of the decline in government jobs is attributed to state and local government employment, which is expected to decline in each of the years 1996-2010 because of the manufacturing investment program. This is directly related to the policy variable change that was introduced in the REMI model, where government spending was reduced by the tax credits to compensate for the forgone taxes. Reduced government spending is positively correlated with government job losses. Some non-manufacturing industries are projected to loose some employment after 2001.

Figure 4: Total Impact in Employment by Sector



Source: The Urban Center at Cleveland State University and JEK Analytics

SUMMARY AND CONCLUSIONS

This report describes and evaluates the Manufacturing Investment Program. The program's objective is to stimulate and encourage manufacturers to continue to invest in new machinery and equipment. This report has presented information on trends in new capital expenditures by manufacturers in Ohio and the U.S. The report has described the Manufacturing Investment Program and the tax credits that Ohio manufacturers receive due to their purchases of new machinery and equipment. Lastly, it has explained the methodology used to estimate total impact and described the total impact of this tax credit program on Ohio's economy.

The Executive Summary summarizes the major findings. Two general conclusions and two recommendations emerge from the report:

CONCLUSIONS

- The Manufacturing Investment Program has a small positive impact on Ohio's economy as measured in terms of jobs, gross state product, and personal income.

- Employment gains of 1,067 in 1996, as projected by the REMI, and the total annual average tax credits of $33 million suggests a cost per job of $31,000.

RECOMMENDATIONS

- If the Manufacturing Investment Program would continue, we strongly recommend that the average investment for each company that determines its eligible investment for tax credit be made more current. At present, average investment is calculated based on expenditures on machinery and equipment in 1992-1994. This was a good decision when the program was initiated in 1995. Recently the program was extended from the end of 1998 to the end of the year 2000 without adjusting the years used to calculate average investment.

- Improve data collection procedures. We recognize that the data is self-reported by the companies that receive tax credits. However, a better employment data would be very beneficial for future evaluations, especially upon future tax effects.

APPENDIX A

DIRECT IMPACT BY COUNTY

Table A.1.: Machinery and Equipment Tax Credit by County 1995 to 1997*

County	# Notices	% of Notices	Average Investment ($)	New ($) Investment ($)	Tax Credit ($)	Annual Credit ($)
Adams	4	0.2%	228,599	1,712,375	150,834	21,548
Allen	18	1.0%	4,340,380	17,892,764	1,568,970	224,139
Ashland	17	1.0%	5,193,266	15,491,829	772,392	110,342
Ashtabula	35	2.0%	6,474,539	17,328,389	1,465,270	209,324
Athens	1	0.1%	0	2,122,890	159,217	22,745
Auglaize	18	1.0%	12,460,346	22,120,883	724,540	103,506
Belmont	2	0.1%	24,428	32,985,984	4,449,810	635,687
Brown	3	0.2%	1,199,104	1,521,419	43,512	6,216
Butler	47	2.7%	57,363,992	112,637,713	6,328,497	904,071
Carroll	4	0.2%	25,271	786,081	99,595	14,228
Champaign	5	0.3%	20,437,923	38,084,931	1,323,526	189,075
Clark	23	1.3%	1,460,515	5,753,019	484,322	69,189
Clermont	12	0.7%	8,201,841	37,087,398	2,166,417	309,488
Clinton	2	0.1%	41,541	820,486	58,421	8,346
Columbiana	26	1.5%	2,961,172	19,967,552	2,295,861	327,980
Coshocton	7	0.4%	3,117,079	16,562,018	1,008,370	144,053
Crawford	7	0.4%	6,670,821	10,173,135	380,541	54,363
Cuyahoga	186	10.6%	145,465,488	323,603,291	16,373,555	2,339,079
Darke	6	0.3%	6,975,609	18,815,577	887,998	126,857
Defiance	7	0.4%	29,097,666	41,743,518	948,439	135,491
Delaware	8	0.5%	727,352	4,762,432	302,631	43,233
Erie	13	0.7%	5,467,139	18,605,286	1,160,752	165,822
Fairfield	15	0.9%	4,038,412	10,640,963	495,191	70,742
Fayette	4	0.2%	1,080,231	2,025,393	70,887	10,127
Franklin	70	4.0%	102,872,621	224,690,335	10,386,900	1,483,843
Fulton	27	1.5%	4,672,087	218,636,275	21,056,376	3,008,054
Gallia	6	0.3%	39,129	2,749,458	365,894	52,271
Geauga	14	0.8%	2,615,189	5,524,284	218,182	31,169
Green	17	1.0%	7,473,471	42,984,011	2,663,291	380,470
Gurnsey	16	0.9%	3,288,010	20,763,592	2,345,235	335,034
Hamilton	95	5.4%	40,262,939	90,999,238	4,653,588	664,798
Hancock	24	1.4%	19,490,631	85,050,327	5,320,192	760,027
Hardin	4	0.2%	150,595	550,213	40,584	5,798
Henry	16	0.9%	22,441,568	62,466,016	3,001,834	428,833
Highland	7	0.4%	1,509,065	6,937,204	732,799	104,686
Hocking	4	0.2%	1,364,347	11,577,002	1,378,708	196,958
Holmes	18	1.0%	4,222,664	4,496,872	133,623	19,089
Huron	14	0.8%	7,091,357	31,061,686	3,197,691	456,813
Jackson	14	0.8%	3,737,665	10,204,077	870,031	124,290
Jefferson	7	0.4%	27,423,066	38,077,450	1,438,342	205,477

County	# Notices	% of Notices	Average Investment ($)	New ($) Investment ($)	Tax Credit ($)	Annual Credit ($)
Knox	19	1.1%	4,936,941	32,186,768	2,268,673	324,096
Lake	73	4.2%	30,348,775	109,852,163	5,962,754	851,822
Lawrence	1	0.1%	95,515	199,337	14,016	2,002
Licking	20	1.1%	6,839,237	21,772,936	1,120,027	160,004
Logan	8	0.5%	3,138,576	5,063,907	145,625	20,804
Lorain	46	2.6%	22,813,458	62,478,616	3,857,308	551,044
Lucas	63	3.6%	73,218,097	354,784,359	33,302,381	4,757,483
Madison	11	0.6%	11,967,938	28,492,955	1,239,376	177,054
Mahoning	34	1.9%	8,404,193	14,717,993	692,051	98,864
Marion	7	0.4%	12,878,404	35,754,984	2,090,436	298,634
Medina	26	1.5%	2,135,960	10,464,809	624,668	89,238
Meigs	1	0.1%	17,568	27,200	1,300	186
Mercer	10	0.6%	2,601,595	7,875,256	599,678	85,668
Miami	27	1.5%	3,046,156	13,848,816	810,199	115,743
Montgomery	82	4.7%	130,436,757	172,106,367	3,968,945	566,992
Morgan	4	0.2%	2,373,385	5,047,870	361,056	51,579
Muskingham	16	0.9%	8,980,546	48,968,868	5,273,699	753,386
Noble	2	0.1%	1,209,348	1,781,500	77,241	11,034
Ottawa	11	0.6%	6,795,185	94,241,711	11,805,281	1,686,469
Paulding	9	0.5%	3,647,592	20,236,482	1,244,167	177,738
Perry	8	0.5%	2,583,576	13,771,242	1,510,335	215,762
Pickaway	7	0.4%	22,976,551	36,391,041	1,006,087	143,727
Portage	37	2.1%	18,762,909	43,256,154	1,836,993	262,428
Preble	4	0.2%	1,240,136	9,401,765	612,122	87,446
Putnam	7	0.4%	14,263,810	88,391,884	5,559,606	794,229
Richland	26	1.5%	14,059,740	60,876,015	4,256,705	608,101
Ross	8	0.5%	5,504,804	30,315,905	1,998,506	285,501
Sandusky	19	1.1%	12,065,164	27,085,113	1,336,496	190,928
Scioto	3	0.2%	2,145,611	9,165,708	947,540	135,363
Seneca	11	0.6%	550,824	3,566,685	302,541	43,220
Shelby	11	0.6%	2,590,211	12,310,223	729,001	104,143
Stark	62	3.5%	36,131,763	97,659,791	6,073,947	867,707
Summit	76	4.3%	23,787,819	75,101,108	4,918,484	702,641
Trumbull	40	2.3%	27,989,553	94,604,060	5,367,571	766,796
Tuscawaras	25	1.4%	12,512,527	43,591,962	2,330,958	332,994
Union	3	0.2%	1,050,868	2,535,718	111,364	15,909
Van Wert	7	0.4%	11,983,856	30,338,661	1,376,610	196,659
Vinton	1	0.1%	6,945	59,552	7,102	1,015
Warren	23	1.3%	15,938,445	95,030,473	6,124,691	874,956
Washingotn	14	0.8%	16,125,071	37,876,018	2,504,100	357,729
Wayne	27	1.5%	9,786,863	32,730,321	1,664,338	237,763
Williams	16	0.9%	12,625,212	21,267,482	648,170	92,596
Wood	23	1.3%	4,325,274	37,827,260	2,512,649	358,950
Wyandot	6	0.3%	3,087,324	12,445,316	1,223,871	174,839
Total	1757	100.0%	1,179,687,200	3,585,515,720	231,941,483	33,134,498

*County information was unavailable for 1 firm. Table A.1contains data on the remaining 1757 notices.

Source: The Urban Center at Cleveland State University and the Ohio Department of Development

APPENDIX B

DIRECT IMPACT BY INDUSTRY

Table B.1: Manufacturing Investment Program by Industrial Sector

SIC	Industry	# Notices	% of Notices	Average Investment ($)	New ($) Investment ($)	Tax Credit ($)	Annual Credit ($)
10	Metal Mining	1	0.1%	64,394	139,563	5,638	805
12	Coal Mining	1	0.1%	0	1,194,408	89,581	12,797
14	Nonmettallic Minerals	12	0.7%	1,742,832	8,317,736	573,594	81,942
15	Gen. Bldg. Contractors	10	0.6%	904,669	2,303,881	159,116	22,731
17	Special Trade Contractors	4	0.2%	76,402	547,945	55,078	7,868
20	Food	70	4.2%	74,108,122	182,466,016	10,293,873	1,470,553
21	Tobacco	1	0.1%	161,080	554,972	29,542	4,220
23	Apparel	9	0.5%	1,941,076	28,457,933	3,431,922	490,275
24	Lumber and Wood	32	1.9%	10,190,155	23,939,625	1,666,929	238,133
25	Furnture and Fixtures	10	0.6%	446,253	2,005,203	140,126	20,018
26	Paper & Allied Products	70	4.2%	35,967,520	108,108,412	5,848,469	835,496
27	Printing & Publishing	56	3.4%	20,625,254	206,681,225	21,838,395	3,119,771
28	Chemicals	119	7.2%	66,737,396	251,580,947	16,608,362	2,372,623
29	Petroleum & Coal	27	1.6%	3,363,592	7,818,540	453,096	64,728
30	Rubber & Misc. Plastics	173	10.4%	63,758,568	182,668,020	12,447,392	1,778,199
31	Leather & Tanning	5	0.3%	6,170,194	17,806,944	1,348,200	192,600
32	Stone, Clay, &Glass	72	4.3%	55,817,344	256,692,286	16,762,668	2,394,667
33	Primary Metal Industries	103	6.2%	179,261,849	583,353,086	42,414,432	6,059,205
34	Fabricated Metal Products	389	23.4%	142,584,895	580,252,723	44,407,921	6,343,989
35	Industrial M&E	201	12.1%	86,209,924	212,210,978	11,262,745	1,608,964
36	Elelctronic & Electric Equip	96	5.8%	119,175,110	310,550,615	14,568,172	2,081,167
37	Transportation Equip	63	3.8%	227,150,615	369,456,712	11,778,978	1,682,711
38	Instruments	18	1.1%	11,013,822	40,422,525	2,219,576	317,082
39	Misc. Man Industries	83	5.0%	25,646,790	69,336,597	4,080,113	582,873
50	Wholesale-Durables	12	0.7%	669,106	2,857,469	201,338	28,763
51	Wholesale-Nondurables	6	0.4%	2,052,844	11,844,903	1,267,184	181,026
55	Automotive Dealers	2	0.1%	89,128	423,411	25,071	3,582
58	Eating & Drinking Places	2	0.1%	0	80,376	10,851	1,550
59	Misc. Retail	1	0.1%	64,931	118,459	4,015	574
60	Banking	1	0.1%	346,737	1,311,821	72,381	10,340
65	Rela Estate	1	0.1%	0	8,513,518	638,514	91,216
73	Business Services	6	0.4%	618,042	1,651,789	86,950	12,421
76	Misc Repair Services	2	0.1%	46,316	71,447	46,316	46,316
87	Engineering & Mgt	3	0.2%	1,520,371	13,571,996	1,626,969	232,424
89	Services, N.E.C.	2	0.1%	76,998	670,387	44,504	6,358
	Total	1663	100.0%	1,138,602,330	3,487,982,468	226,508,010	32,397,987

*SIC data is incomplete for 95 notices filed. Table 5 includes data from the remaining 1663.

Source: The Urban Center at Cleveland State University and the Ohio Department of Development